

WHAT IS CLAIMED IS:

1. A device for amplifying light pulses comprising:
  - (a) a pulsed laser light source for producing light pulses having an optical spectrum;
  - (b) an optical stretcher for temporally stretching the light pulses of said pulsed laser light source; and
  - (c) an optically pumped amplifier fiber for amplifying and temporally compressing the light pulses;  
wherein said amplifier fiber has a positive group velocity dispersion and non-linear optical properties so that the optical spectrum of the light pulses is broadened during amplification of the light pulses by taking advantage of non-linear self-phase modulation.
2. The device according to claim 1, wherein said optical stretcher precedes said amplifier fiber.
3. The device according to claim 2, wherein said optical stretcher comprises an optical fiber having a negative group velocity dispersion.

4. The device according to claim 1, wherein said pulsed laser light source produces fiber-coupled femtosecond light pulses having a pulse energy of up to 100 picojoules.

5. The device according to claim 1, wherein amplified light pulses from said amplifier fiber pass to an optical compressor for further temporal compression.

6. The device according to claim 1, further comprising at least one laser diode for optical pumping of said amplifier fiber.

7. The device according to claim 1, further comprising a highly non-linear optical fiber, wherein amplified light pulses are coupled into said optical fiber for generating an optical frequency comb comprising more than one optical octave.

8. The device according to claim 7, further comprising an interferometer following said highly non-linear optical fiber for characterizing the optical frequency comb.

9. The device according to claim 8, wherein an output signal from said interferometer is passed to said pulsed laser light source for active stabilization.

10. The device according to claim 9, further comprising a second optical amplifier for receiving part of the light pulses emitted by said pulsed laser light source.